REMARKS

The Office Action dated October 27, 2010, has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto.

By this Response, claims 1, 7, 10, 16, 21, 25, and 28 have been amended to more particularly point out and distinctly claim the subject matter of the present invention. Claims 2, 6, 8, 9, 11, and 15 have been canceled without prejudice or disclaimer. No new matter has been added. Support for the claim amendments is provided in the Specification on at least page 6, paragraph [0028], and in the originally filed claims. Accordingly, claims 1, 7, 10, 14, 16-19, 21-25, 27, and 28 are currently pending in the application and are respectfully submitted for consideration.

In view of the above amendments and the following remarks, Applicants respectfully request reconsideration and timely withdrawal of the pending rejections to the claims for at least the reasons discussed below.

The Office Action rejected claims 1-2, 5-11, 14-21, 23-25 and 27-28 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Schilling (U.S. Patent No. 6,128,328) in view of Otsuka (U.S. Patent No. 6,741,859), and further in view of Cherpantier (U.S. Patent No. 5,960,352). The Office Action took the position that Schilling discloses all of the elements of the claims, with the exception of varying the number of carriers in the capacity layer to dynamically vary a total number of carriers in the cell, and a power level of the at least one carrier in the capacity layer is variable such

that the power level of the at least one carrier can be varied in dependence upon a distance of an associated mobile station from the base station. The Office Action then cited Otsuka and Cherpantier as allegedly curing these deficiencies in Schilling. This rejection is respectfully traversed for at least the reasons discussed below.

Independent claim 1 recites an apparatus including a defining unit configured to define a capacity layer for a cell of a communications system. The cell includes a coverage layer having a fixed coverage area provided by at least one carrier. The capacity layer includes at least one carrier, each carrier in the capacity layer having a dynamically variable coverage area. The defining unit is configured to vary the number of carriers in the capacity layer, to dynamically vary a total number of carriers in the cell. A power level of the at least one carrier in the capacity layer is variable such that the power level of the at least one carrier can be varied in dependence upon a distance of an associated mobile station from the base station. A total transmission power for a downlink is divided between the coverage layer and the capacity layer of said cell in dependence on the coverage and capacity requirement of the system, and the power level of the at least one carrier is adjusted without adjusting the total transmission power

Independent claim 10 recites a method including defining, by a station, a capacity layer for a cell of a communications system. The cell includes a coverage layer having a fixed coverage area provided by at least one carrier. The capacity layer comprising at least one carrier, each carrier in the capacity layer having a dynamically variable coverage area. The method includes varying, by the station, the number of carriers in the

capacity layer, to dynamically vary a total number of carriers in the cell. A power level of the at least one carrier in the capacity layer is variable such that the power level of the at least one carrier can be varied in dependence upon a distance of an associated mobile station from the base station. The method further includes dividing a total available power for a downlink between the coverage layer and the capacity layer in dependence on the coverage and capacity requirement of the system, and adjusting the power level of the at least one carrier without adjusting the total available power.

Independent claim 19 recites an apparatus including at least one transmitter configured to transmit a first carrier at a predetermined power level thereby defining a fixed coverage area of a cell of a communications system. The at least one transmitter is further configured to transmit a variable number of further carriers to define, at least in part, a dynamically variable total number of carriers in the cell, wherein each of the further carriers has a dynamically variable coverage area. Power levels of the further carriers depend upon a proximity of a mobile station associated with a carrier to a base station.

Independent claim 25 recites an apparatus including defining means for defining a capacity layer for a cell of a communications system. The cell includes a coverage layer having a fixed coverage area provided by at least one carrier. The capacity layer includes at least one carrier. Each carrier in the capacity layer having a dynamically variable coverage area. The apparatus includes a means for varying the number of carriers in the capacity layer, to dynamically vary a total number of carriers in the cell. A power level

of the at least one carrier in the capacity layer is variable such that the power level of the at least one carrier can be varied in dependence upon a distance of an associated mobile station from the base station. The apparatus also includes means for dividing a total available power for a downlink between the coverage layer and the capacity layer in dependence on the coverage and capacity requirement of the system, and means for adjusting the power level of the at least one carrier without adjusting the total available power.

Independent claim 27 recites an apparatus including a first carrier transmitting means for transmitting a first carrier at a predetermined power level thereby defining a fixed coverage area of a cell of a communications system. The apparatus includes a variable number transmitting means for transmitting a variable number of further carriers to define, at least in part, a dynamically variable total number of carriers in the cell, wherein each of the further carriers has a dynamically variable coverage area. Power levels of the further carriers depend upon a proximity of a mobile station associated with a carrier to a base station.

Independent claim 28 recites a cellular communication system including at least one cell. The cell includes a station configured to provide a coverage layer having a fixed coverage area. The station is also configured to provide a capacity layer comprising at least one carrier, said at least one carrier having a dynamically variable coverage area. The station is also configured to vary the number of carriers in the capacity layer to dynamically vary the total number of carriers in the cell. A power level

of the at least one carrier in the capacity layer is variable such that the power level of the at least one carrier can be varied in dependence upon a distance of an associated mobile station from the base station. A total transmission power for a downlink is divided between the coverage layer and the capacity layer of said cell in dependence on the coverage and capacity requirement of the system, and the power level of the at least one carrier is adjusted without adjusting the total transmission power.

As will be discussed below, Applicants respectfully submit that the combination of Shilling, Otsuka, and Cherpantier fails to disclose, either expressly or implicitly, all of the elements of the claims, and therefore fails to provide the advantages and features discussed above.

Schilling discusses frequency hopping code division multiple access system and method. Specifically, Schilling discusses maximizing channel capacity, i.e., having the optimum number of users per cell, of a frequency hopping, code division multiple access cellular communication system. (Schilling, column 3, lines 10-14).

Otsuka discusses a code division multiple access mobile communication system accommodating increased number of mobile stations. Specifically, Otsuka refers to hand-off methods between base stations, i.e., inter-base station co-operation rather than intra-base station coverage. (Otsuka, column 2, line 5). According to Otsuka, a hard handoff requires a greater power than a soft handoff. (Otsuka, column 2, lines 34-36). Therefore, when the mobile station is around a border of cells, a soft hand-off is suitable,

because the soft hand-off requires only a minimum transmission power for the mobile station to achieve communication with the closest base station.

Cherpantier discusses a method of optimizing frequency use in a multilayer cellular mobile radio network when adding any microcell base stations defining a given microcell that is part of a coverage area of a given macrocell. The network is a combined time-division multiple access and frequency-division multiple access network and includes macrocells and microcells. Each macrocell is associated with at least one control frequency and at least one traffic frequency and each microcell is associated with at least one control frequency. The method includes allocating to the microcell a control frequency identical to a traffic frequency used in a macrocell immediately adjacent the given macrocell.

Applicants respectfully submit that the combination of Shilling, Otsuka and Cherpantier fails to disclose or suggest all of the elements of the present claims. For example, the combination of Shilling, Otsuka and Cherpantier fails to disclose or suggest, at least, "varying the number of carriers in the capacity layer to dynamically vary a total number of carriers in the cell," and "the power level of the at least one carrier can be varied in dependence upon a distance of an associated mobile station from the base station," as recited in claim 1 and similarly recited in claims 10, 19, 25, 27, and 28. In addition, the combination of Shilling, Otsuka and Cherpantier fails to disclose or suggest, at least, "dividing a total available power for a downlink between the coverage layer and the capacity layer in dependence on the coverage and capacity requirement of the system;

and adjusting the power level of the at least one carrier without adjusting the total transmission power," as recited in claims 1, 10, 25, and 28.

According to embodiments of the invention, as discussed in paragraph 0028 of the specification, a proportion of the total available power in the transmitter is allocated to each of the coverage layer and the capacity layer. In the capacity layer, the available power is shared amongst the available carriers. In this way, the power level of various carriers can be adjusted without adjusting the overall power level, to ensure communication with all mobile stations with which such carriers are associated. (See Specification, paragraph 0028).

Applicants submit that none of the cited references disclose or suggest this constraint on the total power level. In particular, linking the output power level of one carrier with another is not provided in any of the cited references. In general, according to prior art solutions, each frequency is looked upon as an independent entity.

Referring to Schilling, it is described that frequency assignment in sets of concentric cells around omni-directional antennas (see Schilling, column 8, lines 21-35, and fig.5). Schilling's aim is to have an equal density of users (see column 8, line 33) within each concentric ring in adjusting the radii of the concentric rings (i.e., the output power for each frequency). In order to avoid bad S/I conditions (signal to noise), Schilling proposes, in column 9, to sector the coverage area. When a remote unit enters a sector, the base station controller sets the frequencies in the sector. Schilling also describes the calculation for the worst case S/I condition in column 9, lines 54 to 67.

In columns 12 and 13, Schilling discloses how to achieve an even number of users in each cell in adjusting the sector size. Further, it is disclosed that the base station causes the remote unit to stage a handover to a neighboring cell. When the microwave user uses parts of the same frequency spectrum as the base station, the base station can either block this part of the spectrum for the remote users in the cell or lets users enter this part of the spectrum until interference with the microwave user is encountered

In contrast, embodiments of the present invention dynamically vary the number of carriers in the capacity layer (to meet the traffic demand). Further, according to one embodiment, the output power at the base station for each carrier is adjusted depending upon the distance between the base station and the mobile station and not to have a constant density of the users over all cells (i.e. carriers). Moreover, according to embodiments, a total available power for a downlink between the coverage layer and the capacity layer is divided based on the coverage and capacity requirement of the system, and the power level of the carriers is adjusted without adjusting the total transmission power.

Schilling, on the other hand, does not disclose or suggest, varying the number of carriers in the capacity layer to dynamically vary a total number of carriers in the cell, varying the power level based upon a distance of an associated mobile station from the base station, dividing a total available power for a downlink between the coverage layer and the capacity layer based on the coverage and capacity requirement of the system, and adjusting the power level of the carriers without adjusting the total transmission power.

Accordingly, Shilling fails to disclose or suggest all of the elements of claims 1, 10, 19, 25, 27, and 28.

Otsuka fails to cure the deficiencies in Schilling outlined above. Otsuka merely discloses switching on further frequencies when the number of users exceeds a certain value and switching off those further frequencies when the number of users drops below a certain value.

In contrast, embodiments of the invention are not concerned with a certain number of users. Having a capacity layer implies a focus on capacity, which is not dependent on the number of users. Rather, different users can create different and varying capacity demands on their connection. Therefore, Otsuka, like Schilling, fails to disclose or suggest varying the number of carriers in the capacity layer to dynamically vary a total number of carriers in the cell, varying the power level based upon a distance of an associated mobile station from the base station, dividing a total available power for a downlink between the coverage layer and the capacity layer based on the coverage and capacity requirement of the system, and adjusting the power level of the carriers without adjusting the total transmission power.

Cherpantier fails to cure the deficiencies in Schilling and Otsuka. Cherpantier teaches, in column 7, how to calculate the range of radio signals based on a path loss calculation. However, Cherpantier, like Otsuka and Schilling, fails to disclose or suggest varying the number of carriers in the capacity layer to dynamically vary a total number of carriers in the cell, varying the power level based upon a distance of an associated mobile

station from the base station, dividing a total available power for a downlink between the coverage layer and the capacity layer based on the coverage and capacity requirement of the system, and adjusting the power level of the carriers without adjusting the total transmission power.

Thus, the combination of Shilling, Otsuka and Cherpantier fails to disclose or suggest, at least, "varying the number of carriers in the capacity layer to dynamically vary a total number of carriers in the cell," and "the power level of the at least one carrier can be varied in dependence upon a distance of an associated mobile station from the base station," as recited in claim 1 and similarly recited in claims 10, 19, 25, 27, and 28. In addition, the combination of Shilling, Otsuka and Cherpantier fails to disclose or suggest, at least, "dividing a total available power for a downlink between the coverage layer and the capacity layer in dependence on the coverage and capacity requirement of the system; and adjusting the power level of the at least one carrier without adjusting the total transmission power," as recited in claims 1, 10, 25, and 28.

Claims 7, 14, 16-18, 20, 21, and 23-24 are dependent upon claims 1, 10, and 19, respectively. As such, claims 7, 14, 16-18, 20, 21, and 23-24 should be allowed for at least their dependence upon claims 1, 10, and 19, and for the specific limitations recited therein.

The Office Action rejected claim 22 under 35 U.S.C. § 103(a) as being unpatentable over Schilling, Otsuka, and Cherpantier, in view of Lawrence (U.S. Patent

Pub. No. 2004/0203837). This rejection is respectfully traversed for at least the following reasons.

Schilling, Otsuka and Cherpantier are discussed above. Lawrence discusses opportunistic channel assignments. Specifically, Lawrence discusses that variable power levels allows cells to be sized according to the subscriber density and demand within a particular region. (Lawrence, paragraph [0002]). In other words, Lawrence discusses the behavior of CDMA/UMTS cells, which shrink in size when the traffic grows within it due to the self interference of CDMA/UMTS technology.

Applicants submit there is no information in Lawrence that cures the deficiencies of Schilling, Otsuka and Cherpantier. For example, Lawrence fails to disclose, either expressly or implicitly, at least, "a variable number of further carriers to define, at least in part, a dynamically variable total number of carriers in the cell, wherein each of the further carriers has a dynamically variable coverage area," and "wherein power levels of the further carriers depend upon a proximity of a mobile station associated with a carrier to a base station," as recited in claim 19.

Claim 22 is dependent upon claim 19 and, therefore, inherits the patentable features of thereof. Accordingly, Applicant respectfully requests that the rejection of dependent claim 22 be withdrawn and this claim be allowed for at leas the same and/or similar reasons as base claim 19, and for the specific limitations recited therein.

The Office Action rejected claims 1, 10, 19, 25, and 27-28 under 35 U.S.C. § 103(a) as being unpatentable over Schilling, in view of Mujtaba (U.S. Patent No.

6,950,678), and further in view of Cherpantier. The Office Action took the position that Schilling discloses all of the elements of the claims, with the exception of varying the number of carriers in the capacity layer to dynamically vary a total number of carriers in the cell, and a power level of the at least one carrier in the capacity layer is variable such that the power level of the at least one carrier can be varied in dependence upon a distance of an associated mobile station from the base station. The Office Action then cited Mujtaba and Cherpantier as allegedly curing these deficiencies in Schilling. This rejection is respectfully traversed for at least the reasons discussed below.

Schilling is discussed above. Mujtaba discusses a control technique for a communication system. Specifically, Mujtaba discusses inserting microcells into macro cells at hotspot. (Mujtaba, Abstract). The microcells are co-located with the macro cells. The microcells use steerable antenna beams to cover hot spots, which can vary with time. Mujtaba discusses that filter tap weights may be adjusted to point the beam to any desired location in the macro cell so the microcell can track the hot spot. (Mujtaba, Fig. 5a).

Applicants respectfully submit that the combination of Schilling, Cherpantier, and Mujtaba fails to disclose or suggest, at least, "varying the number of carriers in the capacity layer to dynamically vary a total number of carriers in the cell," or "the power level of the at least one carrier can be varied in dependence upon a distance of an associated mobile station from the base station," as recited in claim 1 and similarly recited in claims 10, 19, 25, 27, and 28. Additionally, the combination of Schilling, Cherpantier, and Mujtaba fails to disclose or suggest, at least, "dividing a total available

power for a downlink between the coverage layer and the capacity layer in dependence on the coverage and capacity requirement of the system; and adjusting the power level of the at least one carrier without adjusting the total transmission power," as recited in claims 1, 10, 25, and 28. It is therefore respectfully requested that the rejection of claims 1, 10, 19, 25, 27, and 28 be withdrawn.

The deficiencies in Schilling and Cherpantier are discussed above. As noted above, Schilling and Cherpantier fail to disclose or suggest all of the elements of claims 1, 10, 19, 25, 27-28. Furthermore, Mujtaba fails to cure the above-mentioned deficiencies in Schilling and Cherpantier.

Mujtaba discloses simultaneous operation of a macrocell and a microcell being installed at the same site. The macrocell is a normal cell used in radio networks worldwide. The microcell utilizes a smart antenna (Mujtaba calls it a two-dimensional antenna array) to direct the beam of the smart antenna towards the area defining a hot spot. This hot spot can move with time or fade away and another hot spot emerges. Therefore, Mujtaba deals with the problem of how to focus the smart antenna towards the hot spot. In column 2, lines 52 to 53, Mujtaba mentions that the separation of the macrocell and the microcell may be in the frequency domain.

However, Mujtaba, like Schilling and Cherpantier fails to disclose or suggest "varying the number of carriers in the capacity layer to dynamically vary a total number of carriers in the cell," "the power level of the at least one carrier can be varied in dependence upon a distance of an associated mobile station from the base station," and

"dividing a total available power for a downlink between the coverage layer and the capacity layer in dependence on the coverage and capacity requirement of the system; and adjusting the power level of the at least one carrier without adjusting the total transmission power," as recited in the current independent claims. It is therefore respectfully requested that the rejection of claims 1, 10, 19, 25, 27, and 28 be withdrawn.

For at least the reasons discussed above, Applicants respectfully submit that the cited prior art fails to disclose or suggest all of the elements of the claimed invention. These distinctions are more than sufficient to render the claimed invention unanticipated and unobvious. It is therefore respectfully requested that all of claims 1, 7, 10, 14, 16-19, 21-25, 27, and 28 be allowed, and this application passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the applicant's undersigned representative at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, the applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,

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